

Development Of The Robotization Process And It's Impact On The Country's Economy

¹Anna S. Shmoylova, ²Yuri Y. Shvets,

¹student of the faculty of Economics and business
Financial University under the government of the Russian Federation,
Moscow

anna.shmoylova@yandex.ru

²Associate Professor

Institute of Control of Science Trapeznicov RAS

jurijswets@yahoo.com

Article History: Received: 11 January 2021; Revised: 12 February 2021; Accepted: 27 March 2021; Published online: 16 April 2021

Abstract: The paper highlights the basics and essence of innovation processes, describes ways to improve economic efficiency as a result of innovation, and highlights current problems that arise at the stages of innovation implementation. The main features of the robotization process, positive and negative consequences of its implementation are considered, and the impact of the robotization process on the development of the market economy is analyzed.

Keywords: innovative processes in the economy, robotization, "new economy"

In the modern world, most organizations strive to increase the efficiency of their activity and reduce the costs of this activity. The main task of modern organizations is to produce highly competitive products and services with minimal costs and in the shortest possible time. The implementation of this activity entails the mandatory optimization of the organizations' business processes, increasing the efficiency of all company's structural divisions, while maintaining high quality. As a result, there is the introduction of new digital technologies that increase the efficiency of the company's activities with a stable composition of employees or even with their reduction.

Figure 1 shows the "Industry 4.0" that many researchers and scientists are talking about.

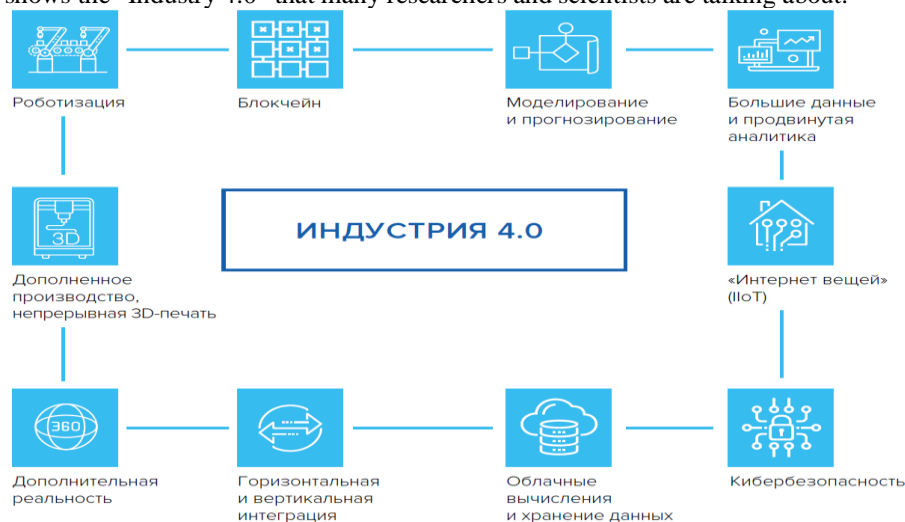


Figure 1-Industry 4.0

Source: D. Istafiev. New industrial revolution. Electronic resource. Access mode:

<https://www.if24.ru/4-promyshlennaya-revolutsiya-mif/> Access date 01.02.2021

According to various studies conducted in recent years in the world, the global market for process robotics is expected to grow rapidly in the next few years to \$ 2.7 billion annually with an average annual growth of about 29%¹.

The active use of digital technologies is a global business trend now. This trend was once well described by such a scientist as Rutger Bregman, who noted in his book "Utopia for Realists. How to build a perfect world"

¹ Georgy Makarenko. What is happening in the global robotization market // RBK. Electronic resource. Access mode: <https://trends.rbc.ru/trends/innovation/5d651aa49a7947477f13a2a4>. Access date 05.02.2021.

that the future is already here, but only it is unevenly distributed². This phrase describes the use of technology in business processes very well³.

According to Klaus Schwab, who is the founder of the World Economic Forum, the third industrial revolution (digital computers and the evolution of information technology) is being replaced by the fourth, which levels the boundaries between digital, physical and biological spheres of activity⁴.

Analysts of the leading international consulting company McKinsey&Company studied more than 2,000 tasks that were performed by people of 800 different professions, and based on this analysis, it was concluded that about 50% of the work could be automated using current technologies. At the same time, 5% of the studied professions can be fully automated, and 60% of the professions can be automated by at least 30%-40%. Table 2 shows the potential for automation and robotization in different countries and the approximate number of citizens of these countries who will be affected by this process⁵.

Table 2
Automation and robotization forecast

Country	Automation potential (%)	Number of people who will be affected by automation (mln people)
Japan	56	35,6
India	52	235,1
China	51	395,3
Russia	50	35,4
France	43	9,7
Germany	48	20,5
Spain	48	8,7
Great Britain	43	11,9
USA	46	60,6
Italy	50	11,8
Canada	47	7,2

Source: Automation and robotization of production // Robotization, automation. Access mode. <https://rparussia.ru/news/avtomatizacziya-i-robotizacziya-proizvo/> Access date. 01/15/2021.

In particular, this study analyzed the situation in Russia in the context of various fields of activity, which is presented in Table 3⁶.

Table 3
Automation and robotization forecast

Field	Automation potential (%)	Number of people who will be affected by automation (mln people)
Production	54	6,5
Retail	52	5,5
Administrative and government offices	47	3,6
Education	20	1,3
Transport and logistics	75	4,3
Health and social support	41	2,2
Agriculture, forestry, hunting and fishing	64	3,3
Construction	64	3,1
Information sector	40	0,858
Finance and Insurance	43	0,92
Scientific and technical sector	36	0,673
Real estate transactions	37	0,462

² Robotization of business processes // Ernst & Young. - Access mode: <https://www.ey.com/Publication/vwLUAssets/ey-report-robotics-kbd-2017-rus/%24FILE/ey-report-robotics-kbd-2017-rus.pdf>

³ Bregman R. Utopia for Realists. How to build a perfect world. - M.: Alpina Publisher, 2018. --- 356 p.

⁴ The official website of the World Economic Forum. - Access mode: <https://www.weforum.org>

⁵ McKinsey&Company official website. - Access mode: <https://www.mckinsey.com>

⁶ McKinsey&Company official website. - Access mode: <https://www.mckinsey.com>

Art, entertainment and recreation	33	0,373
Other services	47	0,479
Mining industry	68	0,585
Hotel business and catering	67	0,57
Wholesale trade	54	0,428
Housing and communal services	52	0,313
Organization top management	65	0,014

Source: Automation and robotization of production // Robotization, automation. Access mode: <https://rparussia.ru/news/avtomatizacziya-i-robotizacziya-proizvo/> Access date. 01/15/2021.

The use of digital technologies and the globalization trends allow modern organizations to fight for customers on a global scale. The company that can provide a timely, reliable and convenient service product, while maintaining operational efficiency, will be the advantage. Organizations must constantly analyze changes with openness and flexibility. New opportunities often arise at the intersection of different fields of activity and technologies, so it is necessary not only to constantly monitor emerging developments, but also to initiate them themselves, interacting with promising startups that arise in such areas as artificial intelligence, bigdata, blockchain, 3D printing, robotics, etc. It should be noted that it is robotics that can become an important step towards improving the efficiency of companies, allowing them to reduce costs from 10% to 100% in those areas of activity that are routine, repeatable, and algorithmized.

The main purpose of robotization is to optimize management processes and organizational development, to bring to a qualitatively new level of performance indicators and the quality of products and services provided.

In reality, the consequences of the robotics introduction can be both positive and negative. Since the introduction of robotics is often carried out in conditions of uncertainty in production activities, not all alternatives are known, and the effectiveness of known actions to achieve the purposes is not clearly defined, the consequences can be both positive and negative.

The positive consequences of the robotics introduction is that innovation management is one of the areas of strategic management, which is carried out at the level of the organization's management and with its help it is possible to create favorable conditions for production and scientific and technical activities in the production organization in such areas as improving and applying new ways of providing services, creating new types of products, modernizing and improving existing production processes, as well as evaluating the profitability of existing production processes.

Figure 2 shows the main advantages of the robotization process.

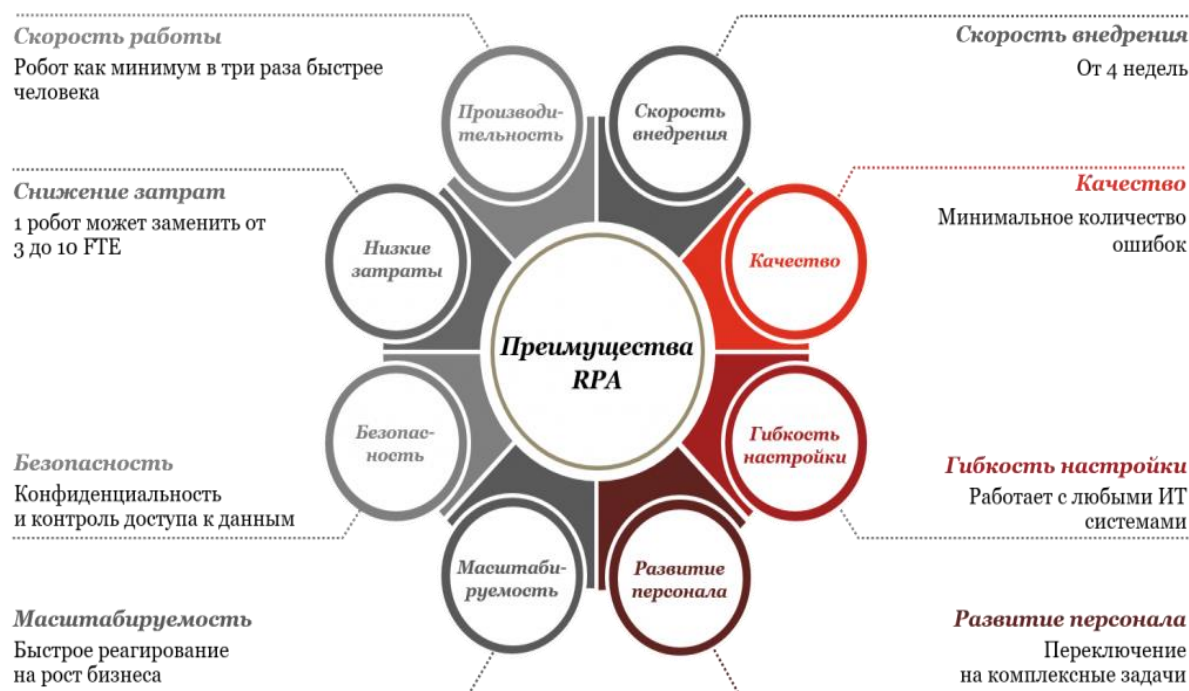


Figure 2-Main advantages of the robotization process

Source: Pros and cons of robotization of production // Pros-Cons. Access mode: <https://narobraz.ru/professii/plyusy-i-minusy-robotizatsii-proizvodstva.html> Access date: 01/17/2021.

As for the negative consequences of the robotics introduction, we can conclude that risks and uncertainties play a key role here. Uncertainty refers to the incompleteness or inaccuracy of information about the conditions for making a decision. The uncertainty associated with the possibility of adverse situations and consequences arising during the project implementation is characterized by the concept of risk. Risk is the potential, numerically measurable possibility of adverse situations and related consequences in the form of losses, detriments, damages due to uncertainty.

Uncertainty and risk in the robotics implementation can be reduced by improving the reliability and updating of information.

Types of uncertainty⁷:

- uncertainty associated with the variability of the state of the economy;
- uncertainty of the external economic situation;
- uncertainty of the political situation;
- uncertainty of natural conditions;
- production uncertainty;
- technological uncertainty;
- uncertainty of the goals and interests of the persons involved in the management decision-making process.

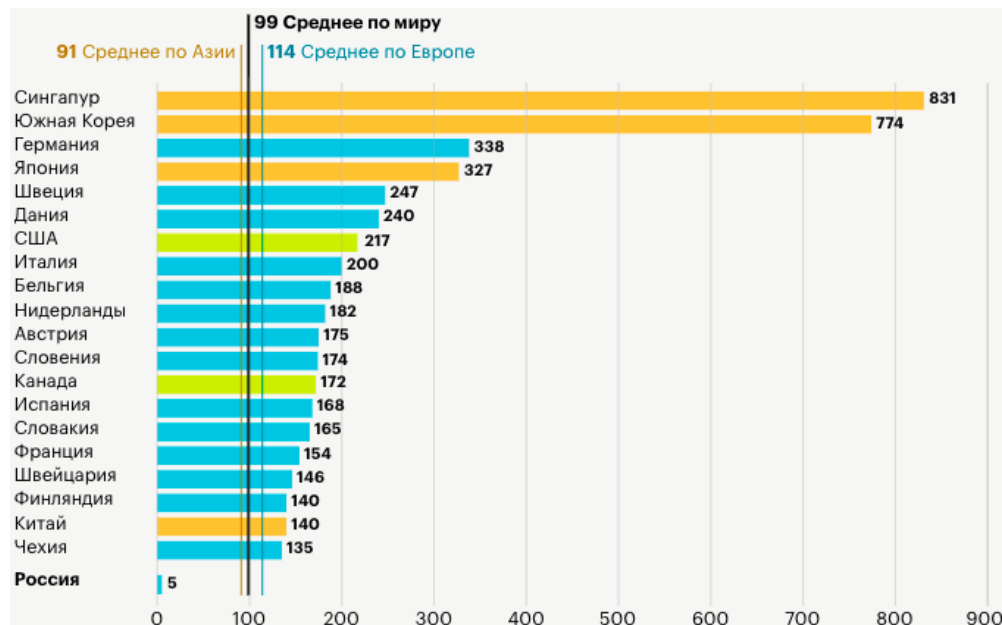
Decisions under uncertainty always contain risk to the extent that there is a risk of making an erroneous or suboptimal decision⁸. Without assumptions about the nature of the risk preferences of the decision-maker, no decisions about innovation activities can be made in conditions of uncertainty.

Therefore, the problem arises: how, despite the existing uncertainty, to choose from the available methods of action at the time of making the decision on robotization, at least a relatively optimal alternative.

According to foreign authors M. Mescon, M. Albert, F. Khedouri, when implementing robotics, the head of the enterprise can use two main possibilities when faced with uncertainty. First, getting more information and analyzing the problem again. This often reduces the novelty and complexity of the problem. The manager combines this information and analysis with the accumulated experience to give a certain probability to a number of alternatives. The second possibility is to act in exact accordance with past experience, judgment, or intuition in order to make a guess about the probability of events. This is necessary when there is no time to collect additional information or the cost of doing it is very high⁹.

Thus, we can conclude that the robotics introduction can lead to both positive consequences for the enterprise and negative consequences for the enterprise.

Figure 3 shows the number of industrial robots per 10,000 employees in 2019 in different countries.



⁷ Kravchenko T.K., Babkin A.E., Golov N.I. Types of uncertainty in the process of making economic decisions // Actual problems of modern science. 2011. No. 20. URL: <https://cyberleninka.ru/article/n/vidy-neopredelennosti-v-protssesse-prinyatiya-ekonomicheskikh-resheniy> (date accessed: 03/20/2021).

⁸ Schumpeter J. Theory of economic development. - M.: Progress, 1982. P.78.

⁹ Mekson M.X. Management principles. – M.: Wiliams, 2017. – p. 21.

Figure 3-Number of industrial robots per 10,000 employees in 2019

Source: World Robotics Industrial Robot Installations Database. Data Availability Chart Electronic resource. Electronic resource: https://ifr.org/img/worldrobotics/Database_-_data_availability.pdf Access date. 01/17/2021.

The situation in Russia has not improved in this regard over the past 2 years. In 2016, the volume of industrial robots purchases in Russia fell by 40% (data from the international practical conference on robotics "RoboSector-2017"). The decline in purchases is due to difficulties in the automotive industry, which is the most automated industry in Russia¹⁰. However, despite the low indicators, experts predict an explosive growth of industrial robot installations in Russia in the near future. This will help to solve the problem of labor shortage in our country¹¹.

The new economy requires a change in understanding the nature of the organization, which is the repository of knowledge that is locked in the minds of employees and embedded in business processes. The company's knowledge base includes both technological and administrative competencies, knowledge of customer needs and supplier conditions. To the extent that these competencies are difficult to imitate, effectively used and rebuilt by the company in its market competition, they can serve as the basis of competitive advantages.

The success of a modern organization lies in its potential to create, transfer, assemble, integrate, and exploit knowledge as an asset, as well as its ability to build strategic alliances.

A feature of the market economy in relation to the knowledge management system is the concept of open information. The market economy is able to quickly adapt to changes in the internal and external environment. It can be said to be based on knowledge, and uses information as one of the necessary and independent resources for its activities.

The development of modern market relations and the formation of economic growth trends are based on the application of the achievements of the economy, which is built on knowledge. Currently, scientific knowledge and the development of science is becoming a direct productive force, and knowledge plays an important role, with the production of knowledge becoming the main source of economic growth of the organization.

Production began to shift towards solving information problems, and this can be illustrated by the example of the automatic design systems creations, thanks to which the processes of creating new products in many industries were greatly accelerated.

Currently, the strategy in the field of economics for any object (both an individual enterprise and the state as a whole) should be based on the knowledge management process, identify its positive aspects and minimize the negative effects. There is a change in traditional approaches and the usual system of the organization functioning, and such basic categories as resources, technology, products, services, and the production cycle acquire a completely new meaning. At the same time, the role of knowledge as an important resource for both the management process and production increases.

The fact that the processes of increasing the use of robots as an important resource, which is a potential support for the economic growth of organizations, is indisputable. The correct use of robots creates prerequisites for creating competitive advantages not only on the scale of the organization, but also on the scale of the state. The fact that robots are able to create competitive advantages is an important indicator of the organization's success in a market economy.

Effective robot management can also provide protection against competitors who infringe on the organization integrity. But in order for the robots' management to contribute to the effective operation of the organization, an appropriate management system is necessary.

In order to optimally use all the advantages of robotics, there should be a special department (division, managing body) in the organizational structure of modern enterprises, whose employees will be engaged in the robotics management and process automation. This department should take into account the knowledge about the external and internal environment, and make informed decisions, take into account the risks in certain processes based on the analysis.

Therefore, the fact that robotics can create competitive advantages is an important indicator of the organization's success in the market economy. The processes that exist in a market economy pose their own challenges to all organizations, and only the right answer to how to develop a unique system for managing robotics and automation will allow the organization to function successfully in a changing environment.

The main purpose of robotization is to optimize management processes and organizational development, to bring it to a qualitatively new level of performance indicators and the quality of products and services provided. The robotics introduction can lead to both positive consequences for the enterprise and negative consequences for the enterprise. The fact that robotics can create competitive advantages is an important indicator of the

¹⁰Robotization in Russia - Achievements and Prospects // Industrial News Information Agency. - 12.04.2017. - Access mode: <https://ria-in.ru/it-industriya/robotizatsiya-v-rossii-dostizheniya-i-perspektivy>

¹¹Ponomareva G.T., Rafikova A.R. Automation and robotization as one of the areas of innovative development of the economy // Problems of Economics and Management. - 2018. - No. 4. - P. 1-8.

organization`s success in the market economy. The processes that exist in a market economy pose their own challenges to all organizations, and only the right answer to how to develop a unique system for managing robotics and automation will allow the organization to function successfully in a changing environment.

Bibliography:

1. Liansky M. Restructuring an enterprises based on the formation of an anti-crisis strategy. Problems of theory and practice of management. - 2016. - No. 11. - pp. 56-62.
2. Markova V. D. Strategic management: a course of lectures: textbook for universities. - Moscow: INFRA-M; Novosibirsk: Siberian agreement, 2017. - 288 p.
3. Official McKinsey&Company website. - Access mode: <https://www.mckinsey.com>
4. Official website of the World Economic Forum. - Access mode: <https://www.weforum.org>
5. Ponomareva G. T., Rafikova A. R. Automation and robotization as one of the directions of innovative development of the economy // Economic and management issues. - 2018. - No. 4. - p. 1-8.
6. Robotization of business processes // Ernst&Young. - Access mode: <https://www.ey.com/Publication/vwLUAssets/ey-report-robotics-kbd-2017-rus/%24FILE/ey-report-robotics-kbd-2017-rus.pdf>
7. Robotization in Russia - achievements and prospects // Information Agency "Industrial News". – 12.04.2017. - Access mode: <https://ria-in.ru/it-industriya/robotizatsiya-v-rossii-dostizheniya-i-perspektivy>
8. Timofeev D. V. Systematic approach to the development of strategic plans in the context of active innovation activity // Management in Russia and abroad. - 2018. - No. 5. - p. 28.
9. Organization management: textbook / ed. by A. G. Porshnev, Z. P. Rumyantseva, I. A. Salomatin. - M.: INFRA-M, 2016. - 736 p.
10. Fatkhutdinov R. A. Innovative management: textbook. - St. Petersburg: Piter, 2013 – - 448 p.
11. Khotyashева O. M. Innovative management: textbook. - Lyubertsy: Yurayt, 2016. - 326 p.
12. Shirenbek H. Enterprise Economics: textbook for universities / Trans. from German. under the general editorship of I. P. Boyko, S. V. Valdaytsev, K. Richter. - St. Petersburg: Piter, 2015 – - 848 p.
13. Schumpeter J. Theory of economic development. - M.: Progress, 1982 – - 454